

THE RADICAL CURE OF HERNIA.

By THEODOR KOCHER, M. D.,

OF BERN.

PROFESSOR OF SURGERY IN THE UNIVERSITY OF BERN.

IN the publication of our first forty-two cases of radical operations for hernia from 1875 until the end of the year 1886, the comparison of results showed a permanent cure in 83.4 per cent. of the cases, and recurrence in 16.6 per cent. Mayor,¹ after carefully going over the cases, concluded that four out of five of the recurrences were due to the fact that the hernial ring had not been sewed. It is understood that those authors, who, as Bassini, limit themselves, in publishing their results, essentially to radical operations for inguinal hernias, show better final results than the surgeons who classify together all of their hernia operations.

From that time on we have always carefully sewed together the hernial canal, and on the ground of that procedure, we have regarded ourselves justified in extending the indications for the operation much wider than before. While we operated on only forty-two cases in eleven years; we have, from the end of the year 1886 until the middle of 1891, in four and a half years, operated upon three times that number; so that Dr. Leuw who has investigated the ultimate results in the cases during

¹Vergl. E. Mayor, Inaug. Dissertation, Bern, 1889.

NOTE BY THE EDITOR.—During a recent visit to the clinic of Professor Kocher, at Berne, my attention was arrested by the excellent results demonstrated in his wards from his operations for the radical cure of hernia, and especially by the fact that his patients were able to safely leave the hospital in from one to two weeks after having been operated upon. At that time I solicited from Professor Kocher a description of his methods of dealing with hernia for publication in the ANNALS OF SURGERY, and was pleased to learn that he had already a paper on the subject completed which was about to be published in the *Correspondenzblatt für Schweizer Aerzte*. A reprint of this paper has been forwarded by Prof. Kocher. In the judgment of the editor it is of sufficient importance to warrant its reproduction in English in the ANNALS OF SURGERY. The translation has been made by Dr. James P. Warbasse.

L. S. P.

this last period, has had 119 patients to look up, whose operative clinical histories were full and exact. It is to be regretted that late reports from only ninety-four cases were obtained, so that we can employ only these in making a judgment of the final results.

- When we had convinced ourselves of the importance of closing the hernial canal, we abandoned the Czerny-Risel method, and adopted another procedure—contrary to the views of certain authors, as especially Anderegg of Socin's clinic. Mayor regarded himself justified in the expression that, "an operation for hernia without suture of the hernial opening is in our eyes no radical operation at all." Czerny,¹ who has done so much in other branches of abdominal surgery, and Risel,² to whose proposition we will return, in the year 1877 amended the proposition of Nussbaum to ligate the hernial sac high up and remove it, in that they added to the operation the "canal suture:" that is the suturing of the two pillars of the anterior inguinal opening.

Our earlier publications emphasized that suturing the ring insured a permanent result; but our second collection of cases shows that it gives no guarantee.

When we compare, without regard to the methods employed, the ninety-four cases, it is seen that recurrence occurred in twenty—a higher per cent. than in the cases operated upon before the year 1886. The explanation is very simple; we had set the indication limits of operation much wider; we conformed to the wishes of the patients to try to cure them of their trouble, even in cases which previously would have been refused.

But of greater interest are the results of a more exact examination of the clinical histories, and especially of the method of operation. In two cases, the radical operation could not be regularly performed. Of the cases of 1887, the hernial sac tore away in the case of patient W. and could not be ligated. He had also a short time before been operated upon by the old method of Heliodorus. In the case of Emilie Ae., 1890, the suturing of the ring was not employed; so that this was a case operated upon by the method of Nussbaum.

¹Studien Z. Radicalbchand. d. Hernien, Wiener Med. Wochensch., 1877.

²Risel, Deutsche Med. Wochenschrift, 1877.

Not less than eight of the cases of recurrence were cases upon which I myself did not operate; and in four of these, it is certain that merely the suturing of the ring, according to the old Czerny-Risel method, was employed. In three cases operated upon by me, and in which recurrence occurred, simply the uniting of the two pillars of the outer inguinal opening was done.

If we wish now to consider the method by which the majority of the cases of the second series were treated, but eighty-one cases remain. Among these, seven recurrences are shown; and it is worth the while to inquire upon what grounds these recurrences can be explained. Then it must be decided whether this method also is incomplete, and how it is to be improved.

The ground seems, *a priori*, sufficiently clear to explain these few recurrences. We have already stated that, unlike some operators, we operated upon nearly all the hernias which presented themselves at the clinic, with the exception of the cases in which there were proper contra-indications. The table of ages, compiled by Dr. Lenn, shows that of 104 patients, twenty were over fifty years of age. We have also operated upon cases in which a special disposition to the formation of multiple hernias was observed, which may be regarded as unfavorable for a permanent cure.

Finally, a very important circumstance is that the "period of quietude" required of the patients was entirely too short. When we exclude the infected and suppurating cases and those in which, on account of thrombosis, the healing process required a longer time, and consider only the 89 per cent. of cases which healed per primam, seven and one-half days elapsed before the patients were allowed up. In the eight cases—11 per cent.—in which suppuration occurred, the duration of healing is calculated at twenty-three days.

That in this short period given to the healing of the wounds, the certainty of radical cure is not increased, is evident; and we agree with Macewen, that it is right and desirable that, after a radical operation, the patient remain six weeks in bed, and not return to work until after eight weeks. On account of limited space in the hospital, such an extension of the period is not possible; and, furthermore, the circumstances of the large number

of our patients are not such that they can give up their work for weeks or months for the purpose of obtaining a radical cure. When we assume that about one-fifth of our patients are subjected to a second operation for recurrence, and that still another interruption of work of eight or fourteen days must be taken into account, the gain in time and work, which we accomplish through our method of after treatment, is a very important one compared with the precept of Macewen. We could subject our patients to a third operation before we should lose them the same amount of time. The chief thing is that we cure the four-fifths of the patients, those who remain radically healed, with a minimal loss of time and sacrifice of every sort. In order to judge this method in comparison with others, every case in which suppuration has occurred must be thrown out of the consideration of the duration of healing. He who strives to secure the best results which the most modern asepsis affords, *prima intentio* healing—a complete union by adhesion in forty-eight hours—again and again finds himself confronted by cases, in which, as a result of accidental infection of a suture, etc., an abscess occurs, followed by a long process of suppuration. This can be prevented, as many surgeons do, by leaving the wound half open, and employing a drainage tube for from four to eight days. Such cases ought not to be called *prima intentio* healing. Suppuration occurred eight times in our ninety-four cases; and in the five cases in which the suppuration was deep, recurrence took place. It is certain that the most of the deep suppuration was due to what we are in the habit of designating as “implantation infection;” and it is easy to understand that, on account of the suture suppuration, which is usually followed by an unloosening of the knots, the suture gives away and the radical operation amounts to nothing.

A last point which, leaving the operation out of consideration, seems appropriate for the explaining of the cause of recurrence, is the discontinuance of the wearing of a truss. On the ground of the views advocated by Socin, that, the wearing of a truss is more harmful than useful, we made it the exception to allow patients to wear trusses after the operation. We now believe that we carried the thing too far. As a matter of course, the truss should be used in the not uncommon cases in which multiple

hernias arise; in those which present a great laxity of the abdominal wall, and especially of the region about the hernial ring; and above all, in the cases of unusually large hernias or those with large rings. It is, indeed, an ideal aim, to endeavor to make the patient immediately independent of the truss. In a careful examination of our cases, only two remain in which the leaving off of the truss can be held accountable for the recurrence. The one is a large serotal hernia reaching as far as the middle of the thigh; and the second man has an unusually large crural hernia. There is no explanation for these two recurrences, other than the size of the hernias and the hernial openings, and in addition, also, the discontinuance of the truss.

It remains for us to describe the method, by means of which, when the wound healed well, we were able to obtain almost perfect results. In seventy-six cases, there were only two recurrences, which are sufficiently explained by the abnormal size of the hernias, and which, perhaps, would not have occurred had a truss been worn. We designate it as the "canal-suture method."

For years, we have in our clinic championed the idea, that—aside from the demand of rigid asepsis—the first and chief thing in the radical operation is this: the hernial sac together with the neck of the sac must be removed in toto; and not the slightest excavation in the peritoneum should remain, to make possible a pressing of the intestines into this infundibulum. As soon as this latter occurs, the wedge principle again begins to operate, and the intestines enter the peritoneal cone, and force themselves through the ring.

We followed in this regard the especial method which Berger¹ described as a procedure of Lucas-Championnière. Long before this publication of this particular surgeon, we always carefully isolated the hernial sac from all of its coverings down to the serosa; especial attention being given to the tunica vaginalis communis and the cremaster. The movability of the sac is in this way increased. It is then drawn down with all strength, in order, as much as possible, to put the peritoneum on the stretch, and the pedicle transfixed and tightly ligated with strong silk.

¹Traité de Chirurgie de Duplay et Reclus, Vol. 6, p. 730.

It has been unjustly doubted that this method suffices to remove every trace of a peritoneal funnel at the inner hernial opening. A preparation has come into our possession which furnishes the proof, that, in a well performed operation, the peritoneum stretches smoothly over the posterior opening—so very smoothly, in fact, that after a short time we were unable to discover, from the abdominal side, the seat of operation. The observations in the case, as they were made at the autopsy, are as follows:

Specimen from a bilateral radical operation for a crural and an inguinal hernia, obtained three weeks after the operation. Patient died of a lung infarction.

The entire thickness of the inguinal region on both sides was removed from the subject; so that the preparations include the operation scars in the skin, as well as the inguinal and crural rings on the abdominal side. The serosa at these points is perfectly smooth and shiny; and at one point in each preparation, is a very slight funnel shaped dimpling, from which radiate shallow folds of peritoneum. The silk ligature used in ligating the neck of the hernial sac can be seen glistening through the thin serosa. The closure at the ligated point is absolutely complete, so that the finest probe can not find an opening. About $1\frac{1}{2}$ cm. from the place of ligation runs the epigastric artery with two veins. An inflammatory thickening can be seen about the neck of the sac. No adhesions of the abdominal organs are present anywhere about the seat of the operation.

Although from this direct observation of the results of the operation, we have learned what high ligation of the hernial sac can do, and what is to be expected from the operation; still we are convinced, with Risel, Czerny, Lucas-Championnière, and others, that to insure a radical cure, another procedure must be added to the ligation of the sac—namely, a thorough closing of the hernial canal.

According to the conclusion at which Anderegg, under the influence of the observations of Socin, has arrived, the suturing of the canal can be dispensed with without any harm, in case that a smooth and tense covering of peritoneum can be secured over the posterior surface of the hernial opening. This is, however, a mistaken idea. The numerous experiences with hernias following laparotomy should have taught that, even after separate

suturing of the peritoneum, every chink in the aponeurotic or muscular parts of the abdominal wall offers an opportunity for the occurrence of hernia. How often do especially those surgeons, who do not take the trouble to apply an exact suture after laparotomy, have occasion to observe smaller or larger hernias appear in the linea alba. Where a new hernial opening is created, there appears, without any predisposing excavation in the overlying peritoneum, an hernia. Of course the predispositions due to congenital peritoneal excavations should not be taken into consideration.

According to the importance of the hernial opening, the relative frequency of recurrence after radical operation in femoral hernia is about the same as in inguinal and even in umbilical hernias. In the latter, it is easy, by means of a transverse suture, to perfectly and exactly close the hernial ring in the linea alba. Similar conditions prevail in inguinal hernias in women. Here the surgeon can completely and solidly close the opening without being inconvenienced by the round ligament and its accompanying vessels; and recurrence will not take place if the hernial canal has been sewed.

In the male, the spermatic cord hinders the complete closing of the inguinal canal; but the solid walls, and especially the fasciae, afford a strong support for tightly drawing up the sutures which surround it. This is not the case with the femoral canal. Above is the tense ligament of Poupart, but below only the slightly resisting pectineal fascia lies upon the pectineus muscle. This fascia presents at the pubic bone a transverse ligamentous thickening, which can be plainly seen on the lower side of the neck of the hernial sac. This is the ligamentum pubicum Cooperi. The pectineal fascia is not strong, so that a firm closing of the hernial opening may be hindered by the tearing out of the sutures.

In order to secure a smooth closure of the peritoneum, much pains has been taken in the manner of closing the hernial opening; and in recent time, many ingenious attempts have been made to accomplish this object.

The method of Barker,¹ which endeavors to render the peritoneum in the neighborhood of the hernia less movable, with the

¹*Brit. Med. Journal*, 1887.

view of hindering subsequent extrusion, is worthy of consideration. Barker does not cut off the ligature with which the hernial sac has been tied, but passes it deeply into the inguinal canal and up through the abdominal wall, in order to firmly hold the neck of the sac, and with it the peritoneum about the posterior inguinal ring. We wish simply to express a doubt, whether the movable peritoneum can in this manner, by means of the short pedicle of the sac, be firmly held for any considerable time. Our own observation has taught us that, after a very short time, the serosa lies smoothly and movably over the place of ligature of the hernial sac. The neck of the sac tied up in this way certainly does not operate as a tampon.

The method of Ball¹ is quite similar. It consists in energetically twisting the sac, and then passing through the neck a ligature, by which it is made fast to the surrounding tissue. The torsion has the advantage, that it draws in the movable peritoneum about the neck of the hernial sac, and in this simple manner renders the peritoneal covering of the posterior ring thoroughly tense.

The methods of Macewen and Bassini have met with especial favor. Both methods are so thoroughly described in the more recent handbooks, that there is no need of here entering upon an exact description. Macewen² transfixes several times the isolated hernial sac, and ties it together as a folded tampon, which he fixes to the abdominal wall after the manner of Barker, by passing the needle deeply into the inguinal canal. This answers as a support behind the internal ring. We wish here to attribute the chief value to the fixation of the peritoneum, and not to the constructing of a tampon, when the hernial sac is not cut away.

How permanent the fixation is, where the sac is immobilized only at a circumscribed place, as in the method of Barker, remains a question.

The second step in the Macewen operation is very important. It consists in drawing up and firmly fixing, with a row of sutures, the posterior wall of the inguinal canal against the place of insertion of the aponeurosis of the external oblique

¹*Brit. Med. Journal*, 1884 and 1887.

²*Brit. Med. Journal*, 1887.

muscle into Poupart's ligament. The inguinal canal, by this means, is closed throughout its entire length; which is more important than the restoration of the oblique course of the canal, which Macewen emphasized. In this endeavor to close the inguinal canal in its entire extent, the spermatic cord is a very great obstacle: not so much in closing the external ring, but in closing the internal opening, it is an especial hinderance. The credit of having gone over this ground, and having in a salutary way removed the difficulty, belongs to Bassini. The proposal to cut away the testicle and spermatic cord in certain difficult cases can be justified only in exceptional cases.

Bassini lays open the inguinal canal, in order to be able to free the spermatic cord as far up as the place where it passes into the abdominal wall. This laying open of the canal affords the advantage of isolating with greater ease the hernial sac, so that it can be ligated and cut away as high up as is necessary. The spermatic cord is then lifted up with a hook, and the posterior wall of the inguinal canal, from the internal ring to the pubic bone, sewed in such a way that the fascia transversa is united with Poupart's ligament and with the border of the rectus abdominis muscle. The cord is then laid back upon the suture line, and the cut edges of the fascia of the external oblique muscle again united over it.

The advantage of the method of Bassini is evident. Instead of simply uniting the pillars of the external ring, as in the previous procedure, and leaving the point of entrance of the intestines into the abdominal wall unconsidered, Bassini creates a resistance at the point where the intestine first leaves the abdominal cavity. He obviates in this way the so-called *pointe de hernie*, with which the formation of herniæ in general, and the formation of recurrences after radical operations, are introduced.

Since Mayor's statistics, we have not been satisfied with suturing the external abdominal ring for inguinal hernia, but have always applied deep sutures throughout the entire extent of the inguinal canal. Crowding back the spermatic cord, the finger is introduced into the canal; the needle is guided deeply into the same, and passed through the walls in such a manner as to bring them together. A running suture is not applied, but the five to seven sutures, which are as a rule necessary, are put

in in such a way that the abdominal wall is strongly elevated by each suture with a view to the application of the following one.

When one makes a dissection on the cadaver of the inguinal canal, he is easily convinced that the chief support of the canal is the tense ligament of Poupart. It is inserted, as Henle has so accurately described, by its outer inguinal pillar into the spine of the pubis in such a manner as to form a gutter, the concavity of which looks upwards. To the side of this gutter lies the thick lower border of the internal oblique and transversalis muscles. The first sends some of its fibers as loops upon the spermatic cord, constituting the cremaster muscle. At the external inguinal opening these muscles become thinner, and are lifted up by the spermatic cord out of the gutter of Poupart's ligament, so that the cord comes to lie in the latter.

After carefully dissecting out the spermatic cord, it is seen that the aponeurosis of the transversalis, passing downwards, is united with the posterior border of Poupart's ligament. This aponeurosis is quite resisting, and passes on as far as the tense aponeurotic border of the rectus abdominis muscle. The internal oblique muscle remains without muscular fibers still further towards the middle line. Its lower border can be sharply defined by dissection, and its aponeurosis passes on to the border of the rectus. But this aponeurosis, as well as that of the transversus, is not so far away as that of the external oblique muscle.

The fascia transversa appears simply as a thickening of the peritoneum. The fold which it forms laterally and parallel to the epigastric artery, for the reception of the spermatic cord, is not tense. Its continuation upon the spermatic cord, the fascia infundibuliformis, acquires, in case of hernia, a decided thickness.

An efficacious closing of the posterior inguinal ring by means of suture is, therefore, out of the question. What must restore a true resistance, is the firm union of the lower border of the internal oblique and transversalis muscles with Poupart's ligament, and on the other side especially the tensely stretched fascia of the external oblique muscle. In case of hernia, this membrane on the anterior wall of the inguinal canal suffers a diminution in its resisting power. As is shown in the illustrations, the tense fibers which pass inwards and downwards separate from one another, and only the weaker bundles of fibers,

passing upwards and inwards, form a support to the tissue in front of the spermatic cord.

The most important thing in closing the opening of an inguinal hernia can be accomplished without employing the method of Bassini of cutting open the canal. The spermatic cord is pushed back; and the sutures, beginning deeply in the canal near the internal abdominal ring, are passed through the internal oblique and transversalis with their fasciæ and through the tense separated fibers of the external oblique muscle. Whether the operation of Bassini is done or not, Poupart's ligament is always the point of support of the sutures beneath.

It is noteworthy that Bassini also observed of one of his cases of recurrence, that he should have included in the suture a larger portion of the deeper abdominal muscles. But we find it practicable, to completely close by suture the entire length of the inguinal canal, without cutting it open, and without the spermatic cord, as it remains in place, being any hinderance.

That this is the fact is evident from a comparison of our results with those of Bassini. Bassini¹ observed seven recurrences—excepting one death—among 251 cases of unincarcerated inguinal hernia. Ninety-eight of his cases were not observed longer than from one to six months; and thirty-three, not longer than six to twelve months. These periods are too short to announce final results. We have in seventy-six cases—leaving out of consideration five cases in which suture suppuration occurred, and the sutures gave way—observed only two recurrences; and they were cases of unusually large hernias. Our observations include but a few cases which were under our notice less than a year; others were observed up to four-and-a-half years. In one of his recurrent cases, Bassini had not removed the sac as usual; and in a patient with double recurrence, catgut had been used; which very well explains the poor result. In two other cases, Bassini declares that there was not a real recurrence, but simply an abnormal bulging at the seat of the hernial operation. An hernia of large volume was present in one of the remaining two cases.

Bassini has therefore arrived at the conclusion that, although recurrences do take place in cases operated upon by his method,

¹ Langenbeck's Archiv. Bd. 40.

still they amount to such a small per cent., they do not detract from the value of the operation. Macewen has shown just as good results with his method. Out of sixty-four not incarcerated inguinal hernias and four not strangulated femoral hernias, operated upon from March, 1879, until January, 1890, Macewen observed only a single imperfect result. This was in a three-year old boy with a very large inguinal hernia, on which a truss had not been used. These excellent results of Macewen were reported by Lauenstein.

Macewen's method has the objection of being very complicated, so that a certain amount of experience is required; and still the results of his operations are not to be compared with those obtained by Bassini or by myself, because Macewen has his patients to lie in bed for six weeks, and to abstain from hard work for eight weeks. The method of Lucas-Championnière differs in this respect from our method. Seventy-four out of the 120 cases, which he reported in 1889, wore trusses after the operation. He had one death and six recurrences. We have already stated above that we agree with the opinion of this author, that the truss assures a cure after operations for large hernias, and in cases of especially lax and nonresisting abdominal walls. In all other hernias we do not agree with Macewen and Lucas-Championnière, but unite with Bassini in the view, that, a good method for the radical operation is able not only to radically cure the patient of his hernia, but to release him from the wearing of a truss as well; and that this result can be accomplished in from one to two weeks.

It has been left until now, to speak of the dangers of the radical operation. It is not necessary to go far back in order to see how these dangers were regarded in earlier time. A. G. Richter¹ says in closing the consideration of the radical treatment of hernias: "There is no means, no method of operation, by which the radical cure of an hernia can in all cases be surely accomplished: not one, which is without difficulty and danger. It is never advisable to operate by any method upon an hernia, which is not strangulated or which is not a source of great annoyance to the patient, simply with a view of radical cure."

¹ Anfangsgründe der Wundarzneikunst, 1798.

J. F. Dieffenbach¹ says in closing his remarks: "It is indeed superfluous to say anything here concerning the value of the radical cure of hernia. We can name all methods only dangerous and uncertain, and I repeat what none better than Lawrence has said against the operation: When any one has a strangulated hernia he subjects himself to the operation in order to save his life. But one who has a simple hernia puts his life at stake in order to be relieved of some inconvenience, and the operation still offers him no other hope than he had already had without it."

Dieffenbach further states: "I beg to repeat what the great anatomist Hesselback says of the radical cure: He asks what advantages to the surgical martyrs can grow out of Kern's daring treatment? He places at stake the lives of his patients, in order that they may afterwards be allowed to wear trusses."

All these adverse opinions have not dissuaded aggressive surgeons from seeking after new methods for the radical cure of hernia. Of course with the antiseptic era the question came upon entirely new ground. Still at one time, when according to Schede,² "the danger to life from the operation had become exceedingly small," the same writer thought that the operation should be advised against in cases of reducible hernia, the retention of which by means of a truss was still possible, so long as the truss could not with certainty be dispensed with by cases which had been subjected to the operation.

This idea that, in reality, the operation for the radical cure should be limited to such hernias as could not be retained by a truss, and to irreducible hernias which gave annoying symptoms, was predominant until the beginning of the last decade. Socin,³ one of the chief advocates of the operation, expressed this view at the surgical congress in Berlin in 1879; and the same can be said of Weinlechner.⁴ In 1881 Reverdin under the influence of Schede, Czerny, Tilanus, and Langenbeck, declared that reducible hernias, which could be retained by a truss, should not be operated upon. In 1884 Munzinger⁵ expressed himself in a

¹ Die operative Chirurgie, Leipzig, 1848.

² Centralbl. für Chir., Nov. 1877.

³ Langenbeck's Archiv. Band 24, Heft 3.

⁴ Wiener Med. Blätter, 1879.

⁵ Inaugural dissertation.

similar manner, having drawn his conclusions from the results of the operations in Kroenlein's clinic in Zürich. Kraske, in 1882-3, discussed the question of castration, as a means of making possible a radical cure in severe cases of hernia.

In 1886 the opinion dared first to be announced that the radical cure is applicable, not only to hernias which give rise to troublesome symptoms and those which are incontrollable or irreducible, but to *all* hernias. Indeed, the most recent writers—Lucas-Championnière, Svensson and Erdmann—prefer to do the operation at an early age, in order that a man, who was destined for the coming years of his life to wear a truss, may at once be made independent.

From recent statistics it is easy to see that the danger to life from the operation has diminished to a minimum. Svensson and Erdmann¹ had one death among 106 cases—a woman who died on the tenth day of acute enteritis and nephritis, when the wound was completely healed. Lucas-Championnière had a single death among his 120 cases. Macewen lost one patient from scarlet fever, out of his ninety-eight. Bassini, from his 250 cases operated upon, lost but one, which died of pneumonia when the wound had aseptically healed. Among our 119 radical operations, only a single death has taken place; and that from pulmonary embolism with bilateral infarcta, on the fifteenth day after the operation, when the wound was completely healed.

It may therefore be boldly maintained, that, the operation for the radical cure for hernia, leaving the above method out of consideration, owing simply to correct asepsis, has become entirely without danger. Professor Sahli replied, when our report was made to the society of the physicians of Bern, that our one patient would probably not have died without the operation. Without going further we yield this point, as well for our case as for the analogous cases of Bassini, Macewen, *et al.* No statistics have ever been given, even in which the details were not figured, according to which there were no deaths out of the hundreds of cases operated upon. It is more than probable deaths would also be observed, if for a long time a hundred hernia patients of every position and age were placed under observation, and for whom nothing further was done than daily

¹ Nord. Med. Arkiv., Bd. 18, Nr. 8.

to set before them a good meal. There are always people, whose general health has suffered such disturbances, that nothing more than a slight blow is required to call out the most dangerous symptoms. Lucas-Championnière has called attention to the fact that these exceptional cases of death are by no means to be taken into consideration in comparison with the numerous dangers such as inflammation, strangulation, etc., which threaten the patient carrying an hernia. The surgeon should, in every candidate for radical operation, carefully examine for contra-indications in the other organs.

Should we recapitulate the conditions necessary for the attaining of a positive radical cure, the first and chief condition is that of perfect asepsis. We know positively enough from our statistics, how a method, which in itself is technically perfect, in case of infection, amounts to absolutely nothing. The aseptic treatment of wounds first established the ground upon which the mechanical perfecting of the operation could be accomplished. It is interesting to observe the old things in the most recent technique. Procedures, which now in the aseptic era give beautiful results, had with slight modifications long ago been advocated and tried.

A point which is of great value in attaining a good result is the thorough isolating of the hernial sac from the surrounding tissue and the overlying fascia. The endeavors of the earlier herniotomists were wrecked because they did not isolate thoroughly enough, and much more because the spermatic cord and testicle were cut away with the sac. As appears from Albert's¹ writing, Heliodorus had already accurately differentiated the accessory hernial coverings from the true sac. Paré and especially J. S. Schmucker devoted much pains to this isolating of the hernial sac from its coverings.

It is conceivable, that, this careful dissecting, at a time when the meaning of infection was not known, must have had its great disadvantages; and that, the effect of this painstaking proceeding remained after the crude efforts of the herniotomists, who were in the habit of cutting away the testicle. It was not a long time ago that the proposal was again made to sacrifice the testicle, in

¹ J. Israelsohn, *Radicalcur der Hernien*. Dorpat, 1880.

especially difficult cases, rather than to jeopardize the chances of radical healing.¹

Protest is rightfully made against castration in any case; and when, in certain cases the isolating of the hernial sac seems especially difficult, it is difficult only for those who have not given sufficient study to the operation. It is a question of isolating not so much the entire hernial sac, and in case of old ruptures and congenital hernias, the often almost impossible separating of the testicle and lower part of the spermatic cord, but of carefully dissecting free the extreme upper part of the sac and the neck. As a rule, this is not difficult, provided that the accessory coverings, and especially the tunica vaginalis communis, are duly laid open. When the hernial sac can not be entirely freed at its lower part, it may be simply cut off and allowed to remain. Richelot² advised cutting through the hernial sac above the testicle, and then dissecting it loose as far up as the internal inguinal ring. Among the more recent surgeons, Bassini has called especial attention to this thorough isolating of the neck of the hernial sac.

The object of this is to so free the sac that it can be well drawn out and ligated so high up that no funnel shaped excavation in the peritoneum remains, into which intestine can again find its way.

The second condition necessary for the radical cure is the high ligation of the neck of the hernial sac. It is interesting to know that Heliodorus recommended that the sac be not removed too high up, for the reason that he did not use any ligature. When Ambrose Paré first introduced the ligature, the highest possible division of the sac was rendered practicable. Schmucker proceeded in this way. The ligature is best applied so that the neck of the hernial sac is pierced with a needle, and half of the neck included in one ligature, while the other ligature is thrown around the entire circumference. The sac is now cut away just below the ligature, and the peritoneum retracts through the internal ring. Among the recent writers who regard of the greatest value this highest possible ligation and amputation of the sac, are Banks, Ball, Lucas-Championnière, Bassini, Svensson and

¹ Kraske, *Centralblatt für Chirurgie*, 1882 u. 1883.

² *Bulletin de la soc. de chir. de Paris*, XIII.

Erdmann. The suture of the neck of the hernial sac was again brought to recognition as a real suture by Nussbaum and Czerny.

The third important thing in the radical cure is the closing of the hernial canal. J. S. Petit seems to have in view a plugging of the canal by the reposition of the hernial sac. From then until the time of Gerdy, every possible method of closing the hernial canal has been tried. Wood employed the suture thirty years ago, by some subcutaneous method, for closing the canal. Steele, Czerny and Risel first sutured the canal by laying it open. We have already called attention to the distinctive features of the methods of Lucas-Championnière, Macewen and Bassini. Kendal Franks has described a method of canal suture in which he uses silver wire. We agree with Barker that silk is the only good suture material for this purpose. A deeply applied multiple silk suture throughout the whole length of the canal fulfills every requirement. For the reason that we have been engaged almost exclusively since 1888 in testing the anatomical conditions in the canal suture for inguinal hernia, we believe that we are justified in placing our suture along side of that of Lucas-Championnière, whose statements concerning the closing of the hernial rings is of a somewhat uncertain nature. Notwithstanding every effort, we have not been able to obtain the treatise by Lucas-Championnière published in 1889, but glean his method from the description of Berger. Judging from a publication by Asderau, it seems that Albert also has operated quite the same as we. It remains to say but a word, how we are able to use the solid canal suture in cases of femoral hernia. The application of the same suture to umbilical hernia is self-evident.

In femoral hernia also, it is necessary to completely isolate the hernial sac serosa, to strongly draw it down, and to tie it as high as possible. With the short and broad pedicle, this is not always so easy as it is in the inguinal hernia. Still more difficult is the suturing of the canal. Nothing is to be gained by sewing the remains of the processus falciformis, which forms the anterior crural ring, to Poupart's ligament; but here also, the deep parts of the femoral canal must be brought together. This is best attained, as we can say after watching the courses which our cases have followed, by passing the sutures through the

transverse portion of the pectineal fascia, which as the ligament of Cooper covers the pectineus muscle at its insertion into the pubis, and drawing it up and firmly suturing it to Poupart's ligament. This causes a broadening of the ligament of Gimbernat, which covers the inner angle of the femoral ring, and usually gives a sufficiently good closure of the hernial opening.

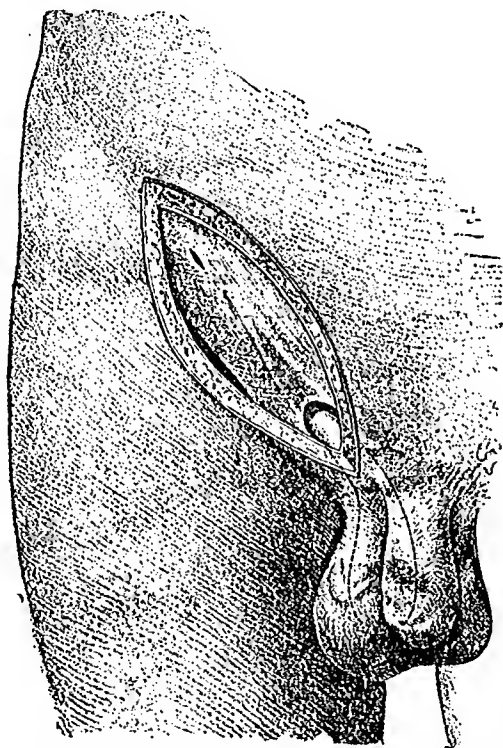


FIG. 1. The primary incision in Kocher's method for the radical cure of hernia.

In closing we wish to describe a new procedure for the radical operation for hernia, which we perfected, and, after sufficient study, performed upon a series of cases and demonstrated before a number of surgeons. For it appears from the not yet completed observations of our final results by Dr. Leuw, that the method

which we had employed has not fulfilled all of our cherished hopes. We have already explained to what degree this view has been modified. This procedure, which, in the literature known to us, has no analogue, is best explained by the accompanying cuts, which were made after drawings by drawing master, Kiener, taking from nature during one of our operations. The method

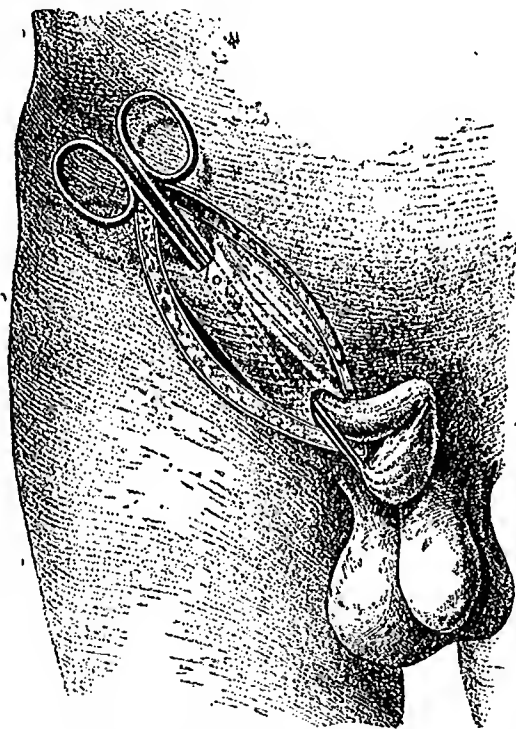


FIG. 2. Forceps introduced along inguinal canal and grasping the sac at its lower end.

suffices to make tense the peritoneum in the region of the inguinal canal, and to fix it against the anterior abdominal wall. This is accomplished after the same manner as in the methods of Barker, Ball and Macewen, with the difference that the stretching of the peritoneum is done in a direction opposite to the direction of the inguinal canal and the course of the hernia; and that the fixation

of the peritoneum is done much more firmly, and in a more permanent manner.

The skin and superficial fascia are divided over the inguinal canal and laterally outwards in the direction of Poupart's ligament (Fig. 1.), and the sup. epigastric artery ligated. At the anterior inguinal ring only the thin fascia of Cooper, which, as a

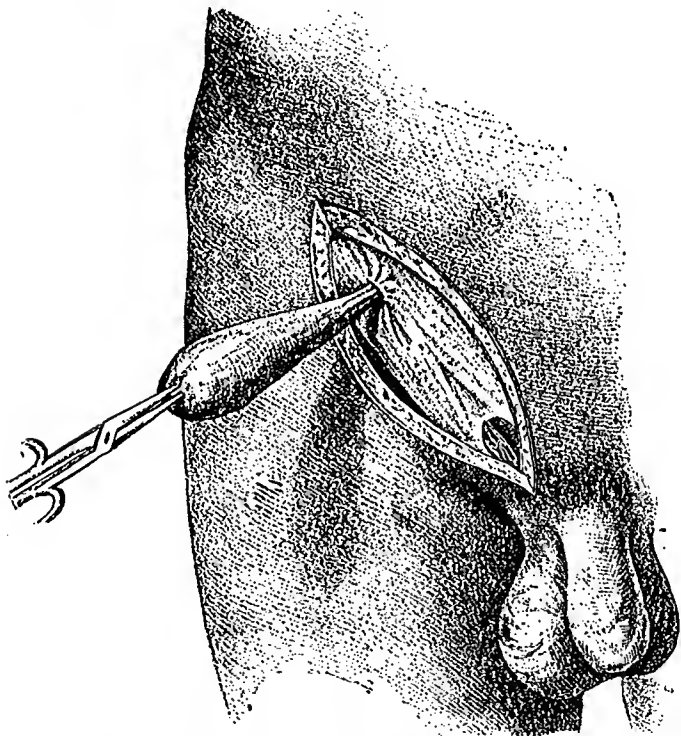


FIG. 3. Sac drawn out through lateral opening in external oblique aponeurosis.

continuation of the tense aponeurosis of the external oblique muscle, covers the spermatic cord, the cremasteric loops and the tunica vaginalis communis, which is especially well developed in hernia, are also divided. The structures of the spermatic cord are now separated, in which, by holding them towards the light, the border of a very thin hernial sac can be recognized. This is

then carefully dissected and isolated from the structures of the cord until it can be strongly drawn down and its pedicle exposed.

The index finger of the left-hand is now introduced into the inguinal canal; and laterally from the posterior inguinal ring, a small opening is made through the aponeurosis of the external oblique muscle (see Fig. 1.). A slender pair of artery forceps is

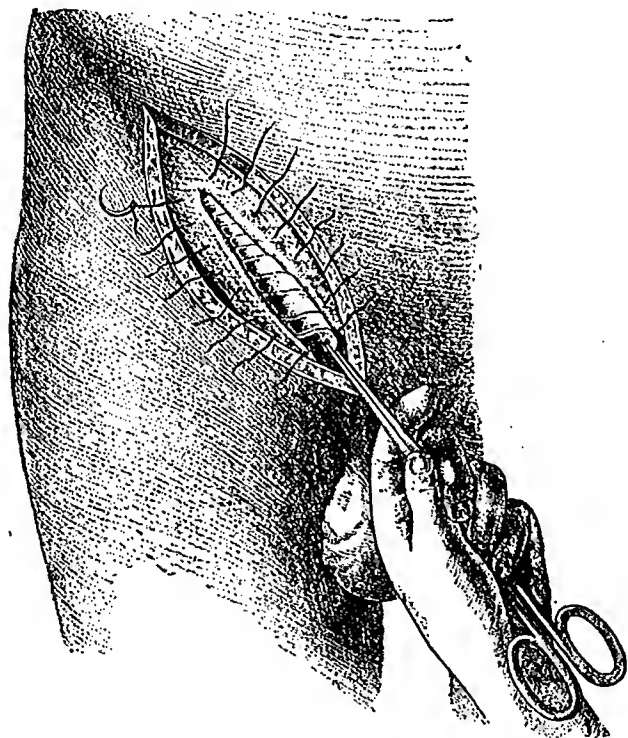


FIG. 4. Sac twisted and laid down external to the aponeurosis covering the inguinal canal.

passed through this opening and through the lower muscular fibers of the internal oblique and transversalis muscles, following the left index finger as it is withdrawn, through the inguinal canal and finally out of the external inguinal opening (see Fig. 2.). With these the isolated hernial sac is grasped and drawn through the inguinal canal and through the narrow opening in its anterior wall—that is in a lateral direction from its upper end.

The hernial sac now hangs through a narrow opening above Poupart's ligament (Fig. 3.). It is drawn out as much as possible, and then, as Heliodorus did, and as Ball has recently advised, it is energetically twisted. The sac is, however, not removed, but strongly drawn down and laid over the outer surface of the aponeurosis of the external oblique muscle against the external inguinal ring, and in the direction of the inguinal canal (Fig. 4.).

By this tension on the sac, as is shown in Fig. 4, the anterior wall of the unopened inguinal canal, and especially the tense aponeurosis of the external oblique muscle, are pressed inwards and backwards into a gutter.

As the twisted sac lies tensely stretched in this manner, beginning at the upper and outer extremity, deep sutures are applied. The sutures are passed above the twisted sac, through the oblique fibers of the aponeurosis of the external oblique muscle and the underlying muscle fibers of the external oblique and transversalis, through the hernial sac itself and including the ligament of Poupart beneath it. These sutures—five to seven or more—bring together also the pillars of the anterior ring, to which the lower end of the hernial sac is fastened. In case of a long sac, all that extends below the external ring is cut away.

In this manner a firm and solid pad or roll is secured over the entire length of the inguinal canal, which forms a better dam against the pressure of the intestines than an implanted patch of skin or periosteum. Furthermore, the peritoneum is drawn laterally on the stretch and firmly pressed to the abdominal wall in the region of the posterior inguinal ring, where it is held by the torsion of the sac and the deep sutures. The operation is more certain when the upper suture can be deeply applied laterally from the place of entrance of the spermatic cord into the abdominal wall.

We have employed the same method in cases of femoral hernial in this manner: The sac, having been completely isolated and twisted as strongly as possible, is drawn through a small opening above Poupart's ligament, and, in the manner above described, included in the sutures which are passed through the pectineal fascia and Poupart's ligament for the purpose of closing the femoral ring.

ON UPWARD DISLOCATIONS OF THE HIP.

By LEWIS A. STIMSON, M.D.,

OF NEW YORK,

SURGEON TO THE NEW YORK HOSPITAL; PROFESSOR OF SURGERY IN THE MEDICAL DEPARTMENT OF THE UNIVERSITY OF THE CITY OF NEW YORK.

THE following case is interesting and worthy of record as an exceptional form of dislocation, and it may properly be made a text for a few remarks upon the varying mode of production and the classification of a group of dislocations which are often described under one rubric because of the common possession of certain clinical features, although they present distinct pathological differences.

Michael M——, forty years old, was brought by the ambulance to the Chambers St. Hospital from Pier 1, North River, March 10th, 1892, at 1 P. M. He had been found by the Ambulance Surgeon seated on the edge of a chair with his right thigh somewhat abducted and flexed and in marked outward rotation. While engaged in unloading some heavy cases from a truck a case weighing 800 pounds had slipped down upon him and forced him backward against another box and then sideways to the ground. On admission his temperature was normal, surface cool, no complaint of pain except when the right thigh was moved.

When I saw him, three hours later, he was lying on his back with the right thigh extended, slightly abducted, and so far everted that the foot rested along the entire length of its outer border on the bed. The upper anterior portion of the thigh close below the groin was rounded and swollen, and showed two incomplete transverse rents in the skin about two inches long and about two inches below the anterior superior spine of the ilium, which evidently had been caused by over-stretching of the skin. The outward rotation gave the thigh a very peculiar appearance; the bulk of the quadriceps extensor formed a longitudinal mass on the outer side between the anterior (inner) aspect and a deep longitudinal depression extending from the trochanter to the side of the knee. Every attempt to move the limb caused pain and sharp contraction of the muscles.